
# Technical Memorandum

Vegetation Management Weed Mat Trial

## January 2008

---

**California Department of Transportation**

**Division of Environmental Analysis**

**Storm Water Program MS27**

**1120 N Street, Sacramento, CA 95814**

**CTSW-TM-07-172-32.1**

# Table of Contents

# List of Figures



For individuals with sensory disabilities, this document is available in alternate formats upon request. Please call or write to Stormwater Liaison, Caltrans Division of Environmental Analysis, P.O. Box 942874, MS-27, Sacramento, CA 94274-0001. (916) 653-8896 Voice, or dial 711 to use a relay service.

# 1. Introduction

This Technical Memorandum presents a summary and the overall performance evaluation of test results of two different types of permanent vegetation control weed mat products. The purpose of this study was to determine the performance installation and function of permanent vegetation control (weed) mat products in a field trial. Evaluating the weed suppression performance of such mats is in accordance with Deputy Directive 02- Vegetation Control program. The study also evaluated installation costs and repair procedures. The potential benefits of this field trial include improved weed control, reduced herbicide use, and reduced potential of herbicides in stormwater runoff. The locations of concern are environmentally sensitive areas adjacent waterways where other methods of vegetation control are limited. This specific test trial study targeted controlling weeds around guardrail posts and a four-foot setback area adjacent the highway shoulder. The scope of services for this project was to order the vegetation weed mat products, ship them to the sites and install them as direct by the product manufacturers. This follow-up evaluation and technical memorandum summarizes the products' installation process and viability for controlling weeds along specific Caltrans roadway areas.

# 2. Project Goals and Objectives

The goal of this project was to determine the effectiveness of a permanent vegetative barrier product as an alternative to herbicide use. The objectives for this project included performing an initial site review of a Caltrans roadside identified by the Department as having invasive weed management challenges, coordinating with specific vegetation weed mat suppliers to provide products, plus installing and evaluating the viability of using these specific products for controlling weeds along Caltrans roadsides.

# 3. Site Evaluation

For this project, Caltrans selected a site along the roadside of State Route 160, post mile 12.2, south of Rio Vista in Solano County. This site was chosen because of the labor intensive weed control efforts and unsafe worker exposure experienced along the shoulder of this two-lane highway adjacent to the Sacramento River. Therefore, it is important for Caltrans to find alternative vegetation weed control products that can minimize maintenance in these areas and maximize worker safety.

During the initial site visit on February 15, 2007, the project team met to discuss vegetation management and to test a sample piece of the vegetation weed mat product provided by the selected manufacturer. For this project, Caltrans selected to test a vegetation weed mat product provided by Universal Weed Cover. This product had been previously tested on another Caltrans project with limited success and had reportedly been improved for better performance.

During this meeting a sample vegetation weed mat section was unloaded and fitted together and installed adjacent the roadway and guardrail. This ridged plastic vegetation weed mat product was a hard plastic material and came in 17”x 48” sections, which fitted together in a locking manner. During this evaluation, Caltrans representatives noted that the ridged plastic weed mat did not form to the curved slope shoulder and uneven ground along the roadway. The ridged plastic was not suitable for this situation leaving too many gaps between the roadway edge and adjacent shoulder soil. Additionally, the manufacturer did not provide installation specifications to secure the rigid plastic panels to the ground. The only direction given by the manufacturer was to use metal stakes and hammer them into the ground. During this evaluation concerns were noted that persistent high winds along the Sacramento River might cause the ridged plastic panels to become loose.

Caltrans representatives then decided to modify the project and conduct a test trial using the Universal Weed Cover product on a limited test section on the adjacent side of the roadway where the shoulder had a flat surface and where the product would have the most potential for success.

Caltrans representatives also directed the testing of an additional vegetation weed mat product made of recycled rubber that might perform better on the sloped or uneven sections of roadway shoulder along the highway by the Sacramento River. This product was a soft recycled rubber material produced by US Rubber, which had been tested by Caltrans on another project with some success. This product came in 100-foot long rolls and was 42 inches wide and 3/8 inches thick. At that time the project scope and schedule was adjusted to add the additional manufacturer and test area.

# 4. Coordinating Product Orders and Shipping

Caltrans directed the ordering of 1,000 linear feet of both vegetative weed mat products supplied by Universal Weed Cover and U.S. Rubber. Both manufacturers were then notified about the project, given the existing site conditions and discussed concerns about securing the product. The following is a summary of the product ordering and shipping process.

## 4.1 Universal Weed Cover

After the initial site visit Universal Weed Cover was contacted regarding concerns about their product and how to secure it in place. At that time, a Universal Weed Cover representative said that they were developing a metal bracket that would attach to the guardrail and hold the weed mat in place. The representative said they would send it in a few weeks when it was ready. At that time, the order was placed and requested them to ship it to the Caltrans Rio Vista Maintenance Yard. Universal Weed Cover said the product would be delivered in four to five weeks.

After two months it became apparent that there were problems with this manufacturer getting this product manufactured and delivered. Month after month they promised that the material would be ready and shipped, but nothing happened. Two weeks later the new metal securing brackets were sent to our office

for our review and approval. These metal brackets were comprised of a combination of a pot metal "C" clamp and a piece of 30-inch angle iron. A quick field test was conducted and it was determined that this product was unsafe for Caltrans to use because of the liability of it coming loose and causing traffic problems. At that time a Caltrans representative was notified about the concerns regarding these brackets. More months passed and finally the manufacturer representative said they worked out the securing attachment and shipped the product to the Caltrans Rio Vista Maintenance Yard. At that time product installation specifications and directions were requested on how to attach the new metal securing brackets. By now, six months had passed since our original order and the project was seriously behind the original construction schedule.

When the Universal Weed Cover product was delivered to the Rio Vista Maintenance Yard, the shipping company mishandled the product and numerous pallets were broken. Additional time had to be spent cleaning up the pallet loads and removing the damaged material. Ordering and coordinating the shipment of this product and attachments proved to be difficult and time consuming.

## 4.2 U.S. Rubber

After the initial site visit, U.S. Rubber was contacted and there were discussions regarding the project, existing site conditions and concerns about attaching the product. During this discussion, the U.S. Rubber representative said they had tried this product with great success on another Caltrans project and that their product was more flexible and had no problems conforming to the uneven shoulder roadway. The U.S. Rubber representative said that the recycled rubber product came in 100-foot rolls and that it could be rolled into place and slots could be cut into the material to fit it around the guardrail posts. Rolls could be joined together creating seams and secured using Henry's 104 asphalt adhesive available at Home Depot. At that time, the order was placed and requested U.S. Rubber to ship it to the Caltrans Rio Vista Maintenance Yard. The U.S. Rubber representative said it would take two weeks for delivery. The product was delivered on pallets within two weeks of the order with no damaged incurred. The ordering of the material and coordination of the delivery occurred without incident.

# 5. Weed Mat Trail Technical Specifications

Prior to construction both manufacturers were contacted requesting that they provide technical specifications regarding installation requirements. Both manufacturers seemed to have problems understanding the process and requirements regarding producing installation specifications. The following is a summary of information provided by both manufactures.

## 5.1 Universal Weed Cover

Universal Weed Cover was contacted requesting that technical installation specifications for their product and for the new metal securing brackets be provided. During these phone conversations, they said that they did not have any installation specifications but would write-up a description of the installation process and send us a brochure and picture explaining the installation procedure. Several weeks passed before we received the requested information. At that time, Universal Weed Cover provided a paragraph write-up of the installation procedure and an 8 ½"x11" brochure. This information was helpful, but was too vague and did provide enough detail to properly instruct the installer how to install the material. At that time, the Caltrans representative was notified and told the installation would continue and be installed as best as possible with the information provided.

## 5.2 U.S. Rubber

U.S. Rubber was also contacted requesting technical specifications for installing their product. During these phone conversations, the sales representative said that they did not have any technical installation specifications for their product because it was not manufactured specifally for this type of use. However, the sales representative said the product would work fine for this installation and instructed us to cut the material using razor knifes to fit it around the guardrail posts and to use Henry's 104 asphalt adhesive to attach the rolls together at the seams. The sales representative also said that the weight of the long rolls would hold the product in place so other securing attachments should not be necessary. No additional information was provided at that time.

# 6. Installation Summary

Since both manufacturers failed to provide adequate technical installation specifications, the installation of the products went slower than expected. The existing sites were cleared of shrubs and ground cover by Caltrans crews prior to construction of this project. Once at the site, the crews raked the ground adjacent the roadway to level the soil and remove any unwanted grasses and ground cover. At that time, both products were installed per the manufactures direction. The following is a brief summary of each manufacturer's product installation process.

## 6.1 Universal Weed Cover

Universal Weed Cover vegetation weed mat installation went poorly. The brochure installation instructions were inadequate and ridged plastic panels were warping the first day at the site due to the heat. The plastic panels warped in both directions causing large gaps between the asphalt road edge and the panels.

However, the process of attaching the panels together went well and they were easy to adjust around the guardrails and lock into place. Once the panels were installed, they tended to shift around too much and had serious warping problems. At that time, per the manufacturer's direction, we attached the additional new metal brackets that were supposed to secure the panels to the ground and prevent the panels from warping. These new metal brackets had several problems and were unsafe. The metal brackets were comprised of a pot metal "C" clamp welded to an angle iron about 30" long. The weld between these two different types of metals did not hold and several of the metal brackets broke apart during initial installation. Furthermore, the metal brackets that were installed failed to hold the plastic panels to the ground and did not prevent warping. Once a large enough section was installed, the Caltrans representative was notified to review the installation.

During the review of the initial installation, the Caltrans representatives determined that the additional securing brackets were unsafe and ordered us to immediately remove them. The Caltrans representative instructed crews to find another way to secure the panels or to remove the panels all together. At that time, another method was selected to secure the panels. Panels were drilled with ½" holes along the roadway shoulder and secured with ½" by 8" long lags bolts to hold the panels together and attached them securely to the roadway shoulder surface. In addition, lag bolts ½" by 10" long were added to the back of these panels to alleviate the panel from warping and secured them to the ground. This method was slow and time consuming but worked well and made the installation acceptable to Caltrans representative. This product as installed with additional securing has a good possibility of providing long-term weed control.

## 6.2 US Rubber

U.S. Rubber vegetation weed mat installation went well. The large 100 foot rolls were cut into 50 foot sections and rolled into place. Workers used razor knifes to cut the material into place and formed it around guardrail posts. Rolls were secured together with a small six inch wide strip of rubber mat under each seam and applying Henry's 104 asphalt adhesive and bolting the seam together. This worked relatively well except that the recommended Henry's adhesive does not harden with enough adhesive strength to hold the seam together. Installation of additional bolts at the seams worked well but another product needs to be used to better hold the material together at the seams. In addition, the Henry's 104 asphalt adhesive was added around the guardrail I-beams to prevent weed growth. This installation went much smoother, but the material was a little too light and rippled along the roadway and shoulder. It was then suggested by a Caltrans representative to add additional securing using the lag bolts concept as used on the Universal Weed Mat product. At that time additional securing was added and the product installation was complete. Once complete, the product installation looked good and was acceptable by the Caltrans representative. This product as installed has a good possibility of providing good long-term weed control.

# 7. Estimated Product Cost Analysis

Although this was a pilot study trial and had significant delays regarding the installation procedures, it was designed be constructed in a timely efficient manor. The following is an estimated cost break down of expected costs for material and labor for future reference.

## 7.1 Universal Weed Cover

| | | |
|---|---|---|
| Vegetation Weed Mat Material Cost | = | $12,000/1,000 LF |
| Additional Anchor bolts | = | $850 |

Clearing & Grubbing the Highway Shoulder (2 field technicians/ one day) $65/Hr =$1040

Raking and Leveling the Road Shoulder (2 field technicians/one day) $65/Hr = $1040

Installing Product (3 field technicians/four days) $65/Hr = $6,240

Does not include traffic control, spraying or mobilization

**Total per LF = $21.17**

## 7.2 U.S. Rubber

Vegetation Weed Mat Material Cost = 9,000/1,000 LF

Additional Anchor bolts = $850

Clearing & Grubbing the Highway Shoulder (2 field technicians/one day) $65/Hr = $1040

Raking and Leveling the Road Shoulder (2 field technicians/one day) $65/Hr =$1040

Installing Product (3 field technicians/three days) $65/Hr = $4680

Does not include traffic control, spraying or mobilization

**Total per LF =$16.61**

# 8. Maintenance Review

After 30 days a preliminary maintenance review was conducted to review the initial installation and observe any maintenance issues. The products were also evaluated for their ability in controlling weeds along the roadside in this situation. The following is a maintenance summary for each products tested.

## 8.1 Universal Weed Cover

The overall installation remained intact and the product was secure with no signs of becoming loose. The product also showed no signs of wear and seemed to control weed growth along the roadside. However, the product did still have signs of panels warping and was noted as being very slippery when wet.

## 8.2 U.S. Rubber

The overall installation remained intact and product was secure with no signs of becoming loose. The product also showed no signs of wear and seemed to control weed growth along the roadside. However, the product did have signs of buckling at the seams because the Henry's 104 adhesive did not adhere as anticipated. However, bolts added at the seams still secured the seams together and should not cause any future problems.

# 9. Product Summary

## 9.1 Universal Weed Cover

Based on this test trial, it was determined that this product has not been fully developed and is not ready for deployment. The rigidity of the product makes it difficult to install on uneven roadside surfaces and the manufacturer needs to develop a standard installation process. The manufacturer should also address the product's warping problem and should be able to manufacture and deliver the product in a timely manner. In addition, the installed costs of the Universal Weed Mat were higher than the recycled rubber vegetation weed mat

## 9.2 U.S. Rubber

Based on this test trial, it was determined that this type of vegetation weed mat has the potential to produce long-term weed control along Caltrans roadways under similar conditions of this test trial. The manufacture was responsive and delivered the product quickly, product was cost effective, and relatively easy to install and maintain. However, this recycled rubber product was not specifically designed for this type of application and the manufacturer should develop an standard installation process and technical/specifications necessary to ensure proper installation of this product. This product has a high potential to assist the Department in controlling weeds and reducing maintenance expenditures.

# Universal Weed Cover Vegetation Weed Mat Installation

Installation process connecting panels

Panels warping in the sun

Panels warping along the road edge

Defective support brackets

Revised installation using anchor bolts

Revised installation site overview

# U.S. Rubber Vegetation Weed Mat Installation

Weed mat cut-out at guardrail post

Finished weed mat surface at guardrail post

Weed mat seam

Weed mat site overview

Weed mat at road edge

Weed mat at shoulder